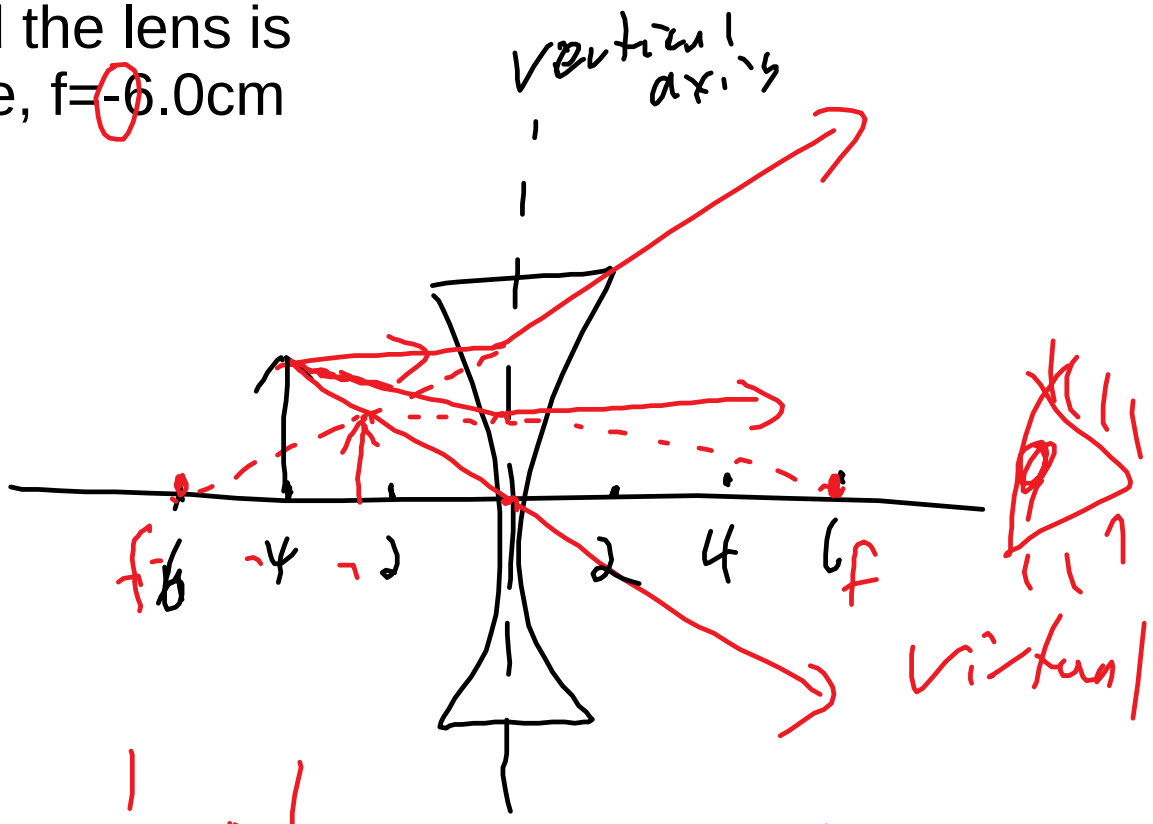
eg. 1. You look at some text with size 0.75 cm through a lens. What is the size and location of the image of the text if you place the lens 4.0 cm away and the lens is

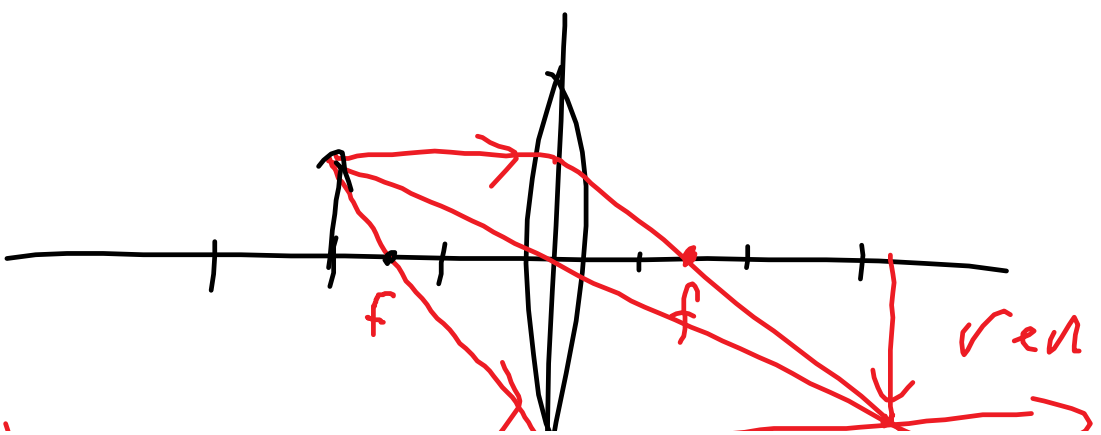
a) concave, f=-6.0cm

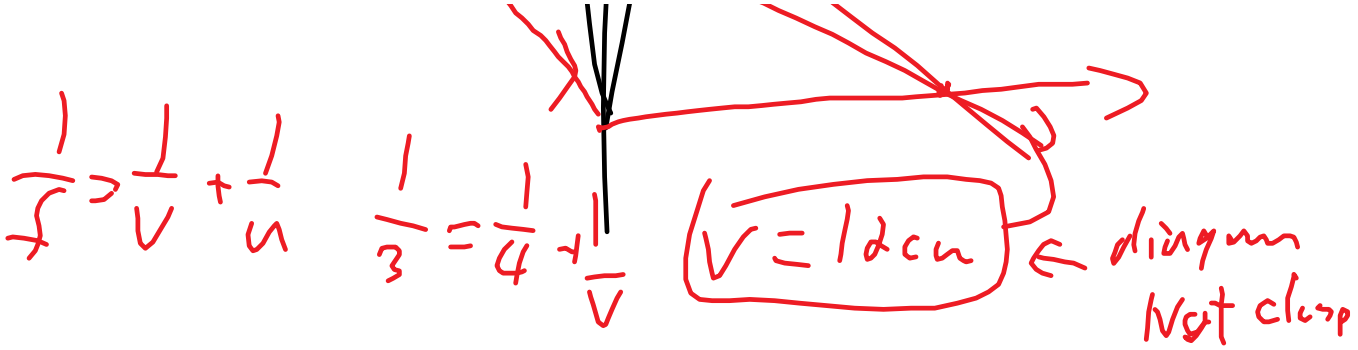


$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v} \qquad \frac{1}{-6} = \frac{1}{4} + \frac{1}{v}$$

$$\frac{-2}{12} - \frac{3}{12} = \frac{1}{v} \qquad v = \frac{12}{5} = 2.4$$

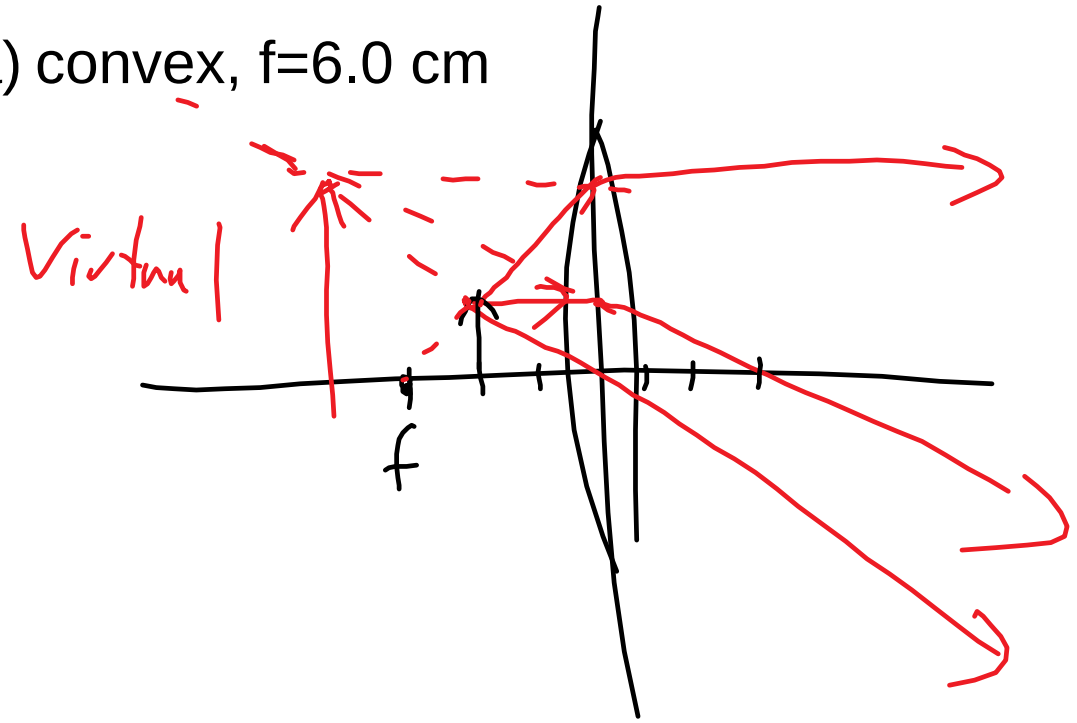
a) convex, f= 3.0 cm





m = -v/u =- -12/4=-3 X (negative because it is inverted)

a) convex, f=6.0 cm



1/f=1/u+1/v 1/6=1/4 + 1/v
2/12-3/12=1/v v=-12cm

use a scale ray diagram and the lensmaker's equations.

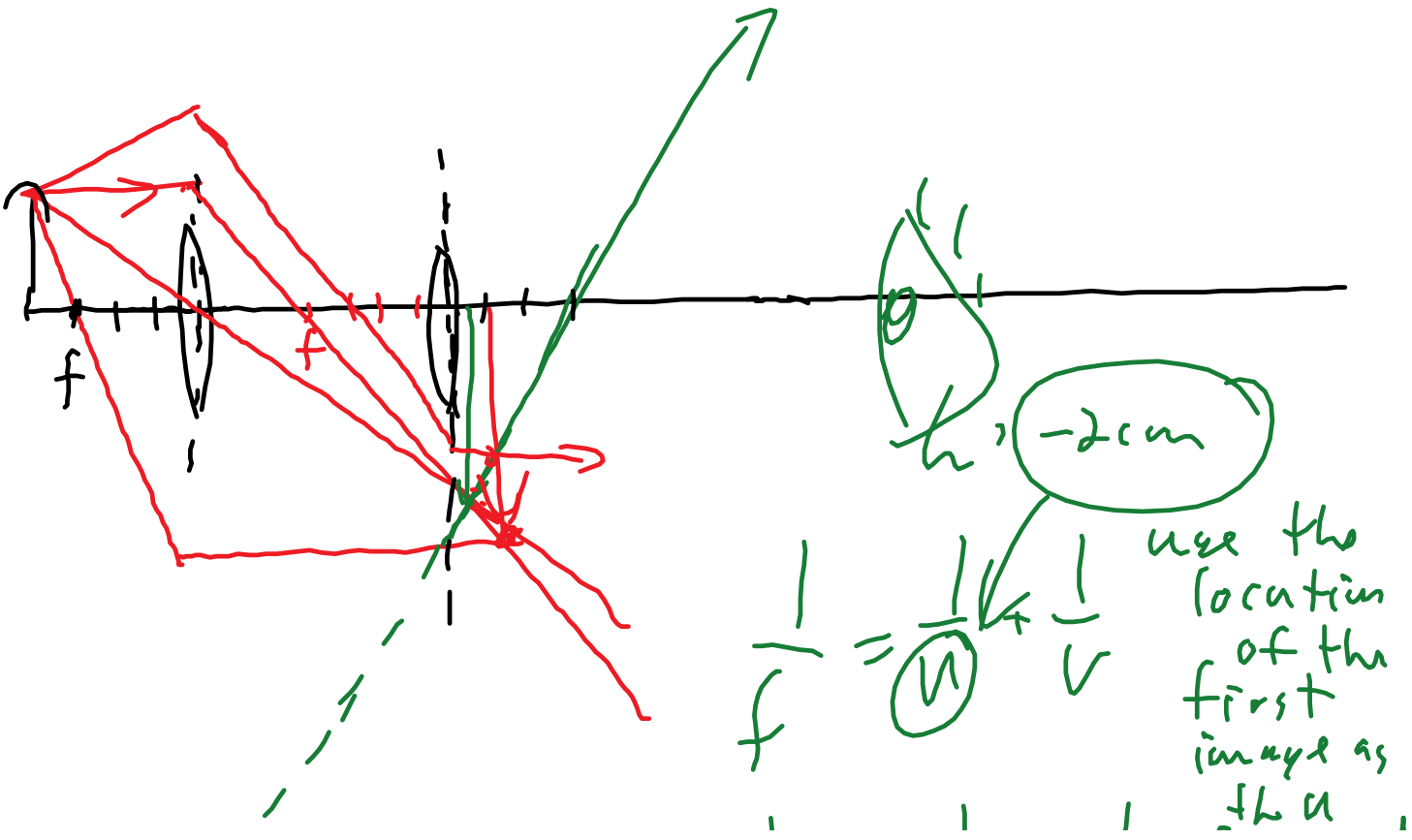
1. You use two convex lenses f=3.0 cm and 6.0 cm to observe the text.

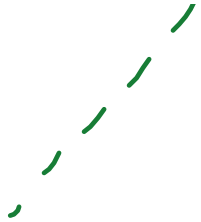
a) what is the combined focal length of the two lenses if they are close together?

P=P1+P2 1/f = 1/f1 + 1/f2 1/f = 1/3 + 1/6
f=2cm

b) if you put the 3.0cm f lens 4.0 cm from the text and the 6.0 cm lens 10.0 cm from the first lens, draw a ray diagram showing the resulting image (use the image from the first lens as the object for the second lens).

p381-383 Q13-20, p386 CR 2.1-2.4





$$\frac{1}{6} = \frac{1}{-2} + \frac{1}{V}$$

image as the U for second

$$\frac{4}{6} = \frac{1}{V} \quad \text{so } V = \frac{3}{2} \text{ cm}$$